

University of Bahrain
College of Information Technology
Department of Computer Engineering

Test II

Student Name	:
ID No.	:
Section	:

Course Title : Digital Logic
Course No. : ITCE 202
Semester : Second
Academic Year : 2004-2005
Date : May 23, 2005
Time : 1Hr

Question	Points Attained
1	
2	
3	
4	
5	
Total	

Show all your work.



Q1(20-points)

Using 4-bit adder (7483) and any necessary logic elements, design a logic circuit that takes a 4-bit signed binary number $W = W_3 W_2 W_1 W_0$, and produces its absolute value ($Z = Z_3 Z_2 Z_1 Z_0$).

$$Z = |W|$$

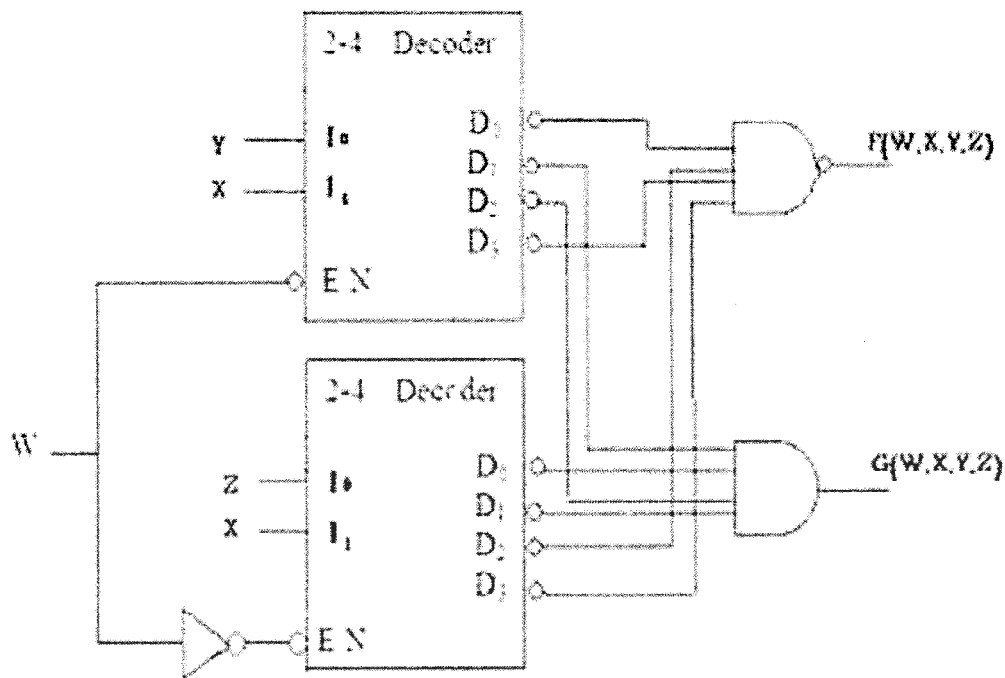
Hint: If W is positive then $Z = W$, else $Z = -W$.



Q2 (20-points)

For the block diagram below:

Find the truth table for the output functions $F(W, X, Y, Z)$ and $G(W, X, Y, Z)$.



Q3- (20-points)

- a- Using **minimum** number of 2-to-1 multiplexers **only**, implement the following function. Assume the complements of the variables are available.

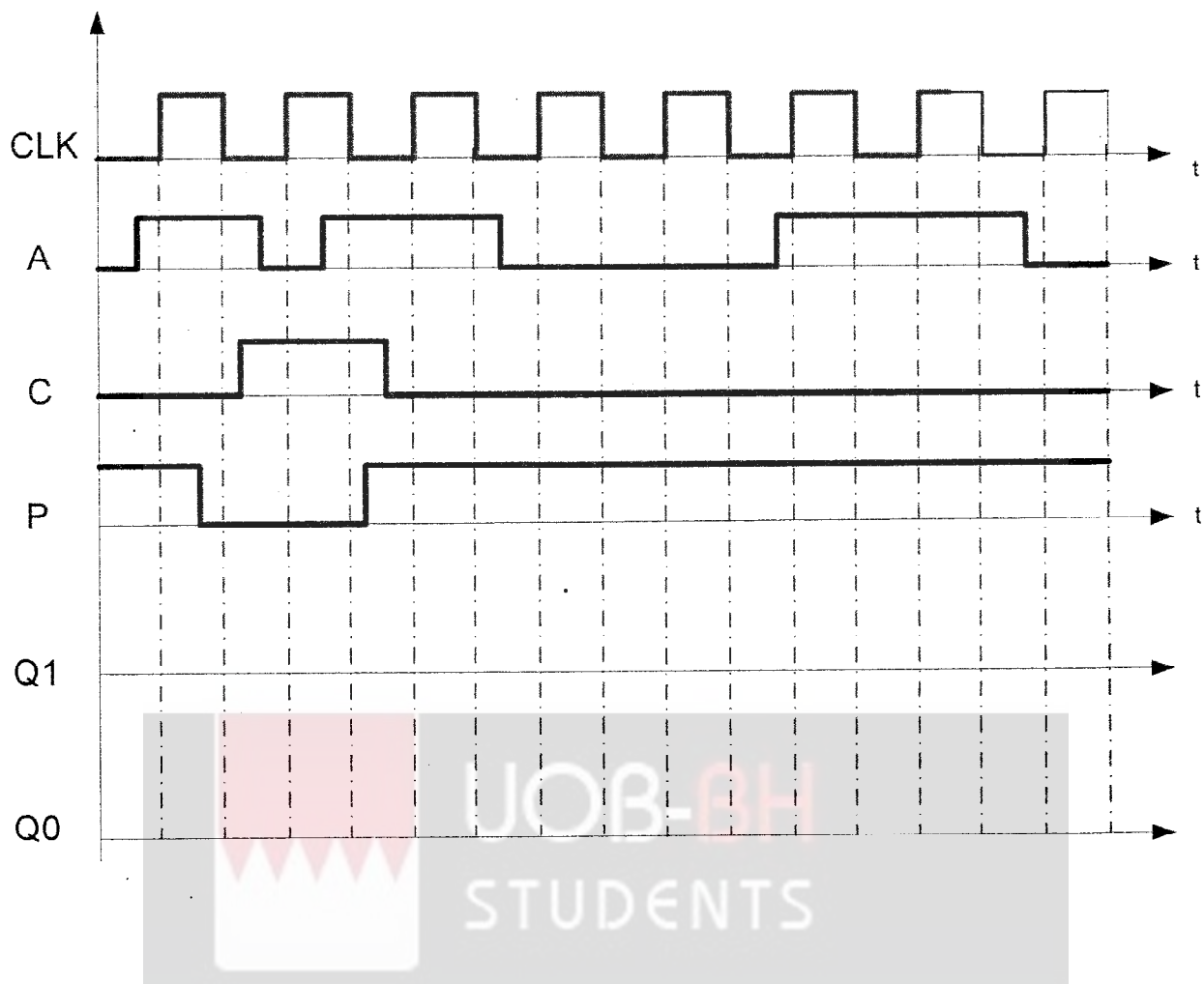
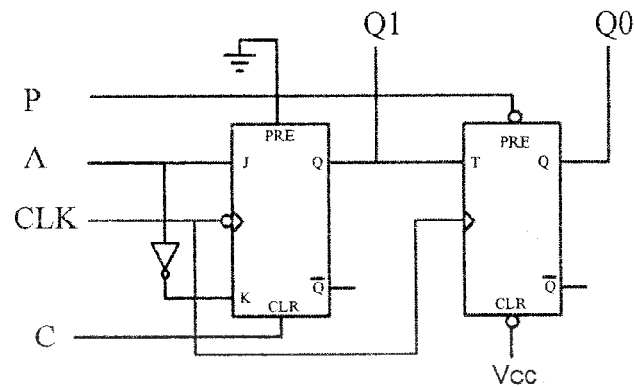
$$F = \sum m(2,5,6,7,8,9,14)$$

- b- Reimplement the function using a **single** (4-to-1) multiplexer with necessary gates.



Q4 (20-points)

The logic circuit below contains a J-K flip-flop and a T flip flop. Complete the timing diagram by drawing the waveforms of signals Q_1 and Q_2 . Assume that both Q_1 and Q_2 , initially are zeros.



Q-5 (20- points)

The characteristic table of $P-I$ flip-flop is as shown in the table. Show how you can convert a $P-I$ flip-flop to a T flip-flop. Use any necessary gates

P	I	Q^+
0	0	0
0	1	Q
1	0	\overline{Q}
1	1	1

